T03D06 – Topic 03 Review MS

1. *alkali metals:*
metallic bonding/a bed of cations in a sea of electrons;
as radius increases down the group, valence electrons are further away from nucleus (and strength of metallic bonding decreases);
halogens:
non-polar/van der Waals' forces between molecules;
as size increases van der Waals' forces increase (and melting point increases);

period 3 elements:
increase in melting points of metals (Na, Mg, Al) due to increase in number of valence electrons **and** decrease in size/the way atoms are packed as solids;
Award mark just for "increased number of delocalized or valence electrons".
silicon:
network covalent solid (with very high melting point);
Award mark also for "many or strong covalent bonds".

P → Ar:
simple molecular (atomic in case of Ar) substances with weak van der Waals' forces (and lower melting points);
trend in P_4, S_8, Cl_2, Ar due to size/mass of particles; 8
Award mark for "decreasing mass or size".
Molecular formulae not necessary.

[8]

2. (a) (i) the ability of an atom to attract a <u>bonding</u> pair of electrons;
inert/do not react/do not attract electrons/stable electron configuration/full outer electron shell/do not form bonds; 2

(ii) electronegativity increases (along period 3 from Na to Cl);
number of protons increases/nuclear charge increase/core charge increase/size of atom decreases; 2
Do not accept "greater nuclear attraction".

(iii) Cl_2 stronger oxidising agent;
Cl_2 has greater attraction for electrons/has a higher electron affinity; 2
Accept converse statements for Br_2.

(b) MgO → basic oxide/alkali;
$MgO + 2HCl \rightarrow MgCl_2 + H_2O$/$MgO + H_2O \rightarrow Mg(OH)_2$;
Al_2O_3 → amphoteric oxide/acidic and basic oxide;
$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$;
$Al_2O_3 + 2OH^- + 3H_2O \rightarrow 2Al(OH)_4^-$/$Al_2O_3 + 2OH^- \rightarrow 2AlO_2^- + H_2O$;
P_4O_6 → acidic oxide;
$P_4O_6 + 6H_2O \rightarrow 4H_3PO_3$; 7
All equations must be balanced.

[13]

3. (a) the ability of an element/atom/nucleus to attract a <u>bonding</u> pair of electrons; 1

(b) electronegativity increases (along period 3 from Na to Cl);
number of protons increases/nuclear charge increases/core charge increases /size of atoms decreases; 2
Do not accept greater nuclear attraction.

(c) Cl_2 is a stronger oxidizing agent/Chlorine's outer shell closer to nucleus;
Cl_2 has greater attraction for electrons/has a higher electron affinity; 2
Accept converse argument for Br_2.

[5]